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ABSTRACT

One approach to test bias has focused on identifying the potential variables or factors that may be responsible for bias in a particular test for a particular subgroup. This approach was employed in this study to determine variables which may relate to differential test performance by Anglo and Hispanic students. The test materials used in this study were the Language Usage and Social Studies Reading tests of the American College Testing (ACT) Assessment. To examine potential differences in Anglo and Hispanic performance, four subgroups of items from each test were specified, with each subgroup representing a separate skill classification. Test results from 776 students, of which 403 were Anglo and 373 were Hispanic, were analyzed. Four ability levels were established on the basis of total ACT score. A two-factor (ethnic group x ability) analysis of variance design was used. The results from the Language Usage item subgroups indicated a significant ethnic group effect for each of the four subgroups. Results from the four social studies item subgroups indicated only one significant ethnic effect: in the history subgroup. The results of this study seem to suggest that differences between Anglo and Hispanic students planning to attend college may be centered in language performance. (BW)

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Differences in Anglo and Hispanic Performance on Standardized Tests

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Paper presented at the Annual Meeting of the
American Educational Research Association
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INTRODUCTION

As an issue in standardized testing, bias has received considerable attention in recent years. In the course of discussing this issue, many different definitions of bias have been proposed. One definition which has some generality in a measurement context is that which describes bias as "differential validity." A test is differentially valid when two persons with the same ability but belonging to two different subgroups do not have the same probability of obtaining the same score.

One approach to assessing tests for differential validity would focus on the results of performance on each test as a whole. With the use of external criteria, it would be possible to determine the extent to which differences in overall test performance for two (or more) subgroups were accurate reflections of differences in future performance.

However, it is also important to evaluate and refine all aspects of the test construction process in order to identify the most efficient and effective set of procedures to insure that the examinations are valid and reliable measures of the particular characteristics of interest.

Recent literature provides complete descriptions of methods for detecting bias (Shephard, Camilli & Averill, 1980; and Rudner, Gelson & Knight, 1980). These investigators have compared techniques for detecting item bias empirically and with Monte Carlo studies. The amount of evidence favoring any one technique over the others has been less than conclusive.

However, another approach (Schmeizer, 1982) has focused on identifying the potential variables or factors that may be responsible for bias in a

particular test for a particular subgroup. This approach is especially useful in efforts to determine what changes should be made in future tests. It calls for the application of experimental designs to evaluate bias in a given test. This approach is employed in this study to determine variables or factors which may relate to differential test performance by anglo and hispanic students.

METHOD

The test materials used in the study were the Language Usage and Social Studies Reading tests of the ACT Assessment, a college entrance exam. The Language Usage Test measures understanding and use of basic elements of correct and effective writing. To examine potential differences in performance between anglo and hispanic examinees on the Language Usage Test, four subgroups of ten items each from the test were specified, with each subgroup representing a separate skill classification. The first subgroup consisted of items measuring use of punctuation; the second subgroup consisted of items measuring the use of grammar; the third subgroup consisted of items measuring knowledge of sentence structure; and the fourth subgroup consisted of items measuring knowledge of logic and stylistic consistency.

To examine potential differences in anglo and hispanic performance due to the specific content of test items, 36 items from the Social Studies Reading Test were selected and divided into four subgroups of nine items each. The first subgroup consisted of items measuring knowledge and understanding of economics; the second subgroup consisted of items measuring knowledge and understanding of history; the third subgroup consisted of items measuring knowledge and understanding of government; and

the fourth subgroup consisted of items measuring knowledge and understanding of psychology.

From all test sites which administered the ACT Assessment, a random sample of sites was selected. From this random sample, sites which tested at least five anglo and 5 hispanic examinees (ethnic group was indicated by self-report) were included in the study. The records of equal numbers of anglo and hispanic students from these sites were then used in the analysis. The final sample contained a total of 776 students, of which 403 were anglo and 373 were hispanic; all students in the sample were in the eleventh or twelfth grade.

Four ability levels were established on the basis of the scaled total score on the ACT Assessment. This total score is based on performance across four tests: Language Usage, Mathematics Usage, Social Studies, and Natural Sciences. The four ability levels to which students were assigned corresponded approximately to the lowest, lower middle, upper middle, and highest quarters of the national population.

A two-factor analysis of variance design was used to analyze the data. Each of the eight subgroups of items as analyzed separately. The first factor was ethnic group and the second factor was ability.

RESULTS AND DISCUSSION

The results of the analyses of the four Language Usage item subgroups are presented in Table 1. The analyses indicate a significant ($p<.05$) ethnic group effect for each of the four, indicating that anglo students performed better than hispanic students on each of the subgroups. The only significant ($p<.05$) ethnic group by ability interaction was for the subgroup of items measuring knowledge of logic and stylistic consistency. A follow-up analysis indicated that at the highest ability level, hispanic

students performed better than anglo students. At the lowest ability level, anglo students performed better than hispanic students. Means of each category by ability grouping are presented in Table 2.

Insert Tables 1 and 2 about here.

The results of the anlayses of the four Social Studies item subgroups are presented in Table 3 and indicate only one significant ($p<.05$) ethnic group effect; on the items in the history subgroup, anglo students performed better than hispanic students. For the remaining three subgroups, there were no significant differences between anglo and hispanic students. There was also one significant item by ability interaction effect on the government subgroup. A follow-up analysis indicated that at the highest ability level, hispanic students performed better than anglo students. At the lower three ability levels there were no significant differences between the two groups. The means of each category by ability grouping are presented in Table 4.

Insert Tables 3 and 4 about here.

The results of this study seem to suggest that differences between anglo and hispanic students who are planning to continue their education beyond high school may be centered in language performance. With the exception of the psychology category, the sets of items were fairly equivalent in terms of overall difficulty. Yet differences between groups in each of the four language areas were well documented and differences between the two groups for the four social studies tests were almost nonexistent. The four social studies categories were based on reading

passages. This suggests that the differences in performance in the language areas could not be assumed to be due to differences in reading ability. The conclusion that the main differences between anglo and hispanic students may be in the area of language performance is not surprising. However, clearly seeing the differences in performance in grammar, punctuation and sentence structure areas may suggest that additional attention to these subjects in high school may help to reduce differences between these very capable hispanic students and their anglo couterparts.

In relation to the issue of potential bias in the construction of standardized tests, this study suggests that the area of logic and style in written material needs to be examined further. In this content area there was evidence of differential performance for the two groups. This indicates that students of the same general ability did not have the same probability of success. To examine this further, this type study could be repeated for confirmation of this effect or individual items could be examined to try to specify which questions within the area of logical and stylistic concerns produce these differential responses.

In conclusion, the results indicate the need for additional study in the area of language usage and the basic elements of effective writing. Future study is needed to clarify the reasons for overall differences in this skill area between anglo and hispanic students and the reasons for the specific differences in the use of logic and style in written passages.

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Table 1

ANOVA Summaries for Punctuation, Grammar, Sentence Structure, Logic and Style

	Source	df	MS	F
Punctuation	Ethnic group	1	25.7	7.4**
	Ability	3	1842.7	528.6
	Ethnic group x ability	3	4.5	1.3
	Error	769	3.5	
Grammar	Ethnic group	1	16.8	6.3**
	Ability	3	1482.0	557.3
	Ethnic group x ability	3	0.7	.3
	Error	769	2.7	
Sentence Structure	Ethnic group	1	13.3	4.4*
	Ability	3	1669.9	555.4
	Ethnic group x ability	3	2.5	.8
	Error	769	3.0	
Logic and Style	Ethnic group	1	53.0	20.1**
	Ability	3	1377.4	545.4
	Ethnic group x ability	3	7.8	3.1*
	Error	769	2.5	

*p<.05
**p<.01

Table 2

Means and N's for Language Categories by Ability and Ethnic Group

		Ability			
		Low 1	2	3	High 4
Punctuation	Anglo $\bar{X}$	4.67	6.20	7.35	8.40
	Hispanic $\bar{X}$	4.23	6.23	6.79	8.12
Grammar	Anglo $\bar{X}$	4.90	6.21	7.21	8.30
	Hispanic $\bar{X}$	4.61	6.02	6.97	8.32
Sentence Structure	Anglo $\bar{X}$	4.30	5.66	6.79	7.87
	Hispanic $\bar{X}$	3.99	5.52	6.85	7.40
Logic and Style	Anglo $\bar{X}$	4.65	5.96	6.88	7.86
	Hispanic $\bar{X}$	3.97	5.78	6.66	8.00
	Anglo N	87	124	125	67
	Hispanic N	189	99	60	25

Table 3

ANOVA Summaries
for Economics, History, Government, Psychology

	Source	df	MS	F
Economics	Ethnic group	1	.9	0.4
	Ability	3	1563.7	639.9
	Ethnic group x ability	3	1.6	0.7
	Error	769	2.4	
History	Ethnic group	1	11.3	4.7*
	Ability	3	1756.9	727.4
	Ethnic group x ability	3	1.5	0.6
	Error	769	2.4	
Government	Ethnic group	1	0.1	.02
	Ability	3	1478.1	627.4
	Ethnic group x ability	3	7.1	3.0*
	Error	769	2.4	
Psychology	Ethnic group	1	0.6	.14
	Ablity	3	1577.2	373.1
	Ethnic group x ability	3	6.5	1.5
	Error	769	4.2	

*p< .05

Table 4

Means and N's for Social Studies Categories
by Ability and Ethnic Group

		Ability			
		Low 1	2	3	High 4
Economics	Anglo $\bar{X}$	4.47	5.50	6.61	8.03
	Hispanic $\bar{X}$	4.51	5.25	6.62	8.00
History	Anglo $\bar{X}$	3.79	5.16	6.39	7.40
	Hispanic $\bar{X}$	3.50	5.04	6.40	7.16
Government	Anglo $\bar{X}$	3.39	4.41	5.50	6.77
	Hispanic $\bar{X}$	3.25	4.62	5.30	7.48
Psychology	Anglo $\bar{X}$	1.59	2.41	3.34	5.30
	Hispanic $\bar{X}$	1.71	2.46	2.93	4.72
	Anglo N	87	124	125	67
	Hispanic N	189	99	60	25